

Abstract

A Study on Developing Guidelines on Facility Model for Safety Training Classes for Surplus Classrooms

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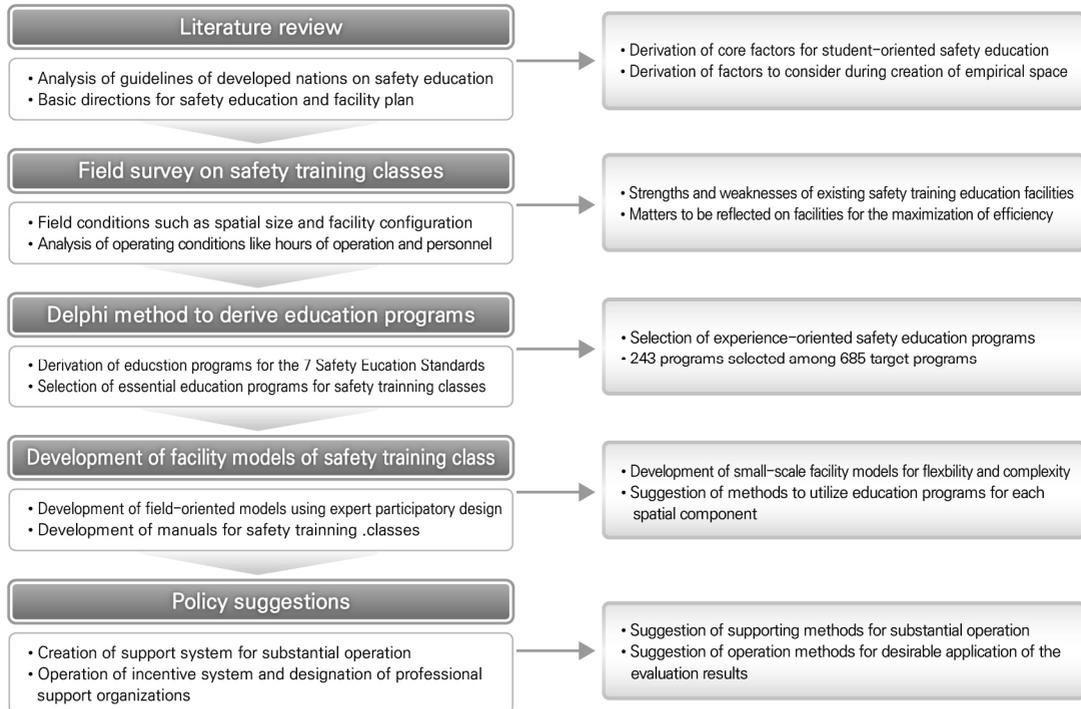
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The Ministry of Education has been expanding safety training infrastructures such as the comprehensive training safety center and safety training bus since 2014 in order to improve safety awareness and response action of students in case of accident. In December 2015, the 'Development of Operation Model for Safety training Class' and 'Promotion of Project on Safety training Class' were presented for the second half of 2016 through the 『Master Plan for the Prevention of School Safety Accidents』. The purpose of this study is to derive education programs for safety training class, create unit spaces and present components and methods of utilizing the spaces for the development of facilities models closely related to various policy, operation plan and facility construction projects promoted by related institutions such as the Ministry of Education, schools, architects and companies.

As shown in [Figure 1], this study is divided into five steps. Literature review and field survey were used to analyze strengths and weaknesses of existing safety training classes, and a manual consisting of five facility models was developed based on the Delphi method and expert participatory design. This study offers policy suggestions for the efficient operation of safety training class such as support for substantial operation and desirable application of evaluation results.

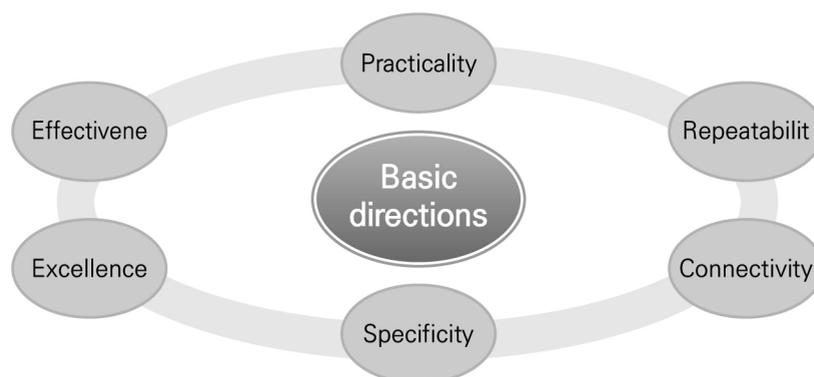


[Figure 1] Research process

1) Safety education in developed nations and basic directions for training space facility plan

In order to create a space for effective safety education, it is necessary to derive the basic directions for safety education and the basic performance required for training education space. Accordingly in this study, domestic and overseas safety education guidelines were analyzed to derive five factors including ① practicality, ② effectiveness, ③ repeatability, ④ excellence ⑤ connectivity and ⑥ specificity as illustrated in [Figure 2]. Practicality is a factor that aims to inspire reasonable and critical mind and increase self-confidence by responding to accidents rationally through safety accidents similar to the reality. Effectiveness is a factor that cultivates an ability to effectively prevent safety accidents through accurate finding of risk factors. Repeatability is a factor that constructs education methods and facilities to help repeat the training for effective behavior. Excellence refers to an environment in which different learners can receive appropriate level of education

according to their physical development and maturity of mind such as grade and age. Connectivity is a factor that enhances educational effects by interacting with members of local communities and colleagues or connecting with education programs. Lastly, specificity involves creation of education programs and facilities necessary in each region.



[Figure 2] Basic directions for safety education and facility plan

2) Field survey on safety training classes

Since there is a need to propose facility models for more efficient operation at school sites by deriving problems of education and facility through field survey on the existing safety training classes, this study performed field analysis of 7 elementary schools in South Korea that are currently operating safety training classes.

<Table 1> Current status of education programs in safety training class of South Korea (comprehensive)

Item		School						
Category	training Space	A	B	C	D	E	F	G
Living safety	Water safety	○	○	○	○		○	○
	Elevator safety							
	Gas and electric safety	○	○	○	○	○	○	○
Traffic safety	Car safety		○	○	○	○	○	○
	Pedestrian safety	○	○	○	○	○	○	○
	Bicycles safety	○	○	○		○	○	○
Violence and security	-							

Item		School						
Category	training Space	A	B	C	D	E	F	G
Drug and internet addiction	-	○						
Disaster safety	Wind damage							
	Earthquake experience			○		○		○
	Fire evacuation experience		○	○	○	○	○	○
	Fire extinguisher experience	○	○	○	○	○	○	○
	Reporting							
	Descending life line						○	○
Occupation safety	-							
First aid	CPR	○	○	○	○	○	○	○
Total	12	7	8	9	7	8	9	10

Summary of the survey results is as follows. First, safety training classes were generally constructed with size of about one or two classes. As presented in <Table 1>, training education programs were mainly focused on traffic safety, fire safety and water safety. It would be necessary to develop complex facility models that can widely accommodate for various training safety activities in narrow spaces.

Second, there can be many displaying items such as bulletin boards on walls that are disadvantageous for natural ventilation as in [Figure 3] or obstacles that make it difficult to accommodate for special class students as in [Figure 4]. Third, each education space is intended for an independent topic, causing difficulty in application of more effective teaching and learning methods such as storytelling. Education spaces with different characters and length are formed within the same space, showing limitation in accommodating for many groups. Fourth, it can be difficult for many students to participate in practices in short time because of limited spatial size and educational materials. Fifth, since safety training classes are primarily operated by a single teacher and education cannot easily be repeated multiple times, these classes are mostly for students at respective schools. Surrounding schools can only allow students of a grade to participate each year. Therefore, it is necessary to develop facility models that can secure additional experts and be utilized by minimal number of instructors.



[Figure 3] Example of traffic safety experience



[Figure 4] Example of pedestrian walkway

3) Delphi method for selection of education programs

To select essential education programs for safety training classes among programs included in the 『7 Safety Education Standards』, the Delphi survey was performed on a group of experts that includes 19 teachers working at international safety schools, demonstration research schools and safety training classes and 11 teachers who participated in the formulation of the 『7 Safety Education Standards』.

In the 『7 Safety Education Standards』²²⁾, there are 531 education programs that correspond to elementary, middle and high school curricula among 685 safety education programs, excluding 154 programs for kindergarten curriculum. However, about 211 education programs out of 531 programs are theory-oriented programs with the ratio of practice below 50%. As shown in <Table 2>, the Delphi method was used on 320 safety education programs. Coefficient of variation (CV) often used in previous studies was utilized to determine concordance of the expert group.

<Table 2> shows that 278 education programs out of 320 programs showed concordance of expert opinions, and 243 education programs corresponding to 75.94% of 320 programs were selected as programs very important to be included in safety training classes. Looking at 7 major categories, all education programs under the first aid category were included, followed by 91.16% of programs under the living safety category. The ratio of selection

22) This study referred to the modified version of the 『7 Safety Education Standards』 presented in March 2016.

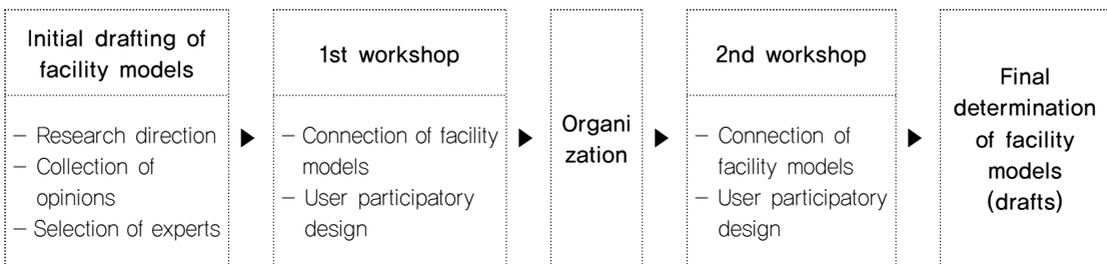
was high for the living safety category because this category contains substantial contents related to disaster, traffic and first aid. The ratio of program selection was 76.47% for traffic safety and 74.07% for disaster safety. Rates of the occupation safety category and the drug and internet addiction category were relatively low because they are primarily based on theory-oriented contents.

〈Table 2〉 Derivation of education programs

7 Major Safety Education Categories	Education Programs for the 2nd Survey (No.)	Essential Education Programs (No.)	Rate (%)	Education Programs	
				CV ≤ 0.5	CV > 0.5
Disaster safety	27	20	74.07%	26	1
Traffic safety	51	39	76.47%	46	5
Living safety	61	55	90.16%	55	6
First aid	47	47	100.0%	47	0
Drug and internet addiction	54	30	55.56%	35	19
Violence and security	74	51	68.92%	63	11
Occupation safety	6	1	16.67%	6	0
Total	320	243	75.94%	278	42

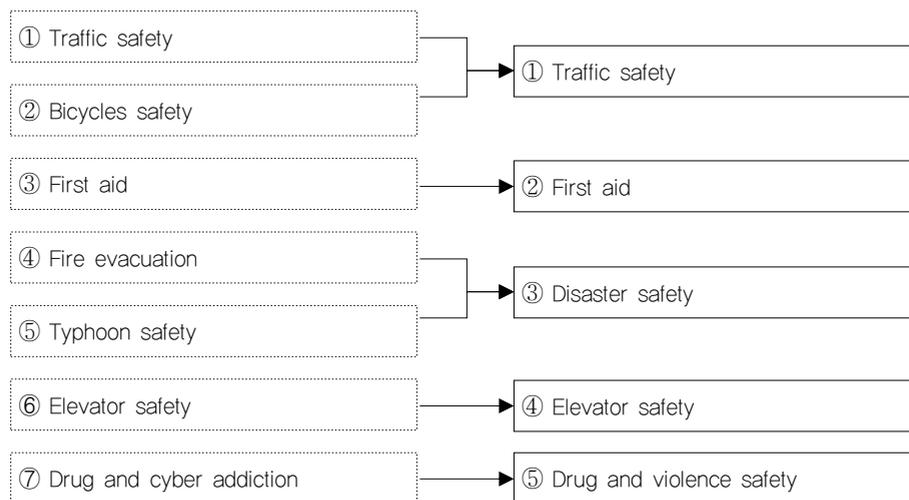
4) Development of facility models for safety training classes

[Figure 5] describes the process for development of facility models. First draft of facility models was devised based on the results of field survey and Delphi survey, and the final facility models (drafts) were developed through two expert workshops.



[Figure 5] Process for development of facility models for safety training classes

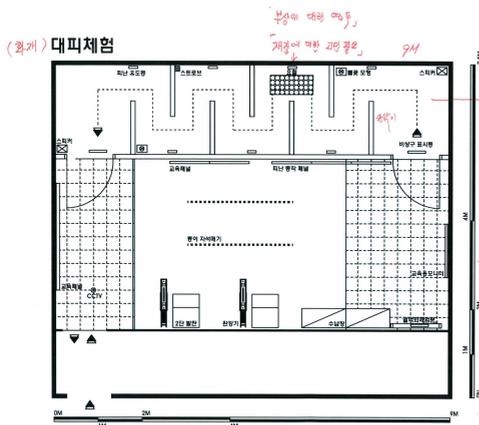
The first draft of facility types comprised of 7 models including traffic safety model and water safety model. Based on the expert opinions, they were reorganized into ① traffic safety model, ② disaster safety model, ③ first aid model, ④ elevator safety model and ⑤ drug and violence safety model as shown in [Figure 6] in order to implement diverse safety education programs in small space.



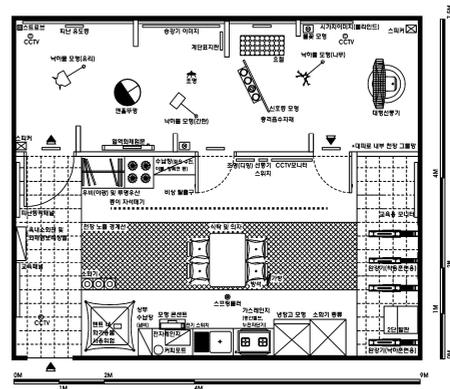
[Figure 6] Change of facility models by expert council

Looking at the traffic safety facility model, inner walls of subway safety space were removed to broaden the space for activities. Umbrellas and safety equipment were added for pedestrian safety education, and the space was formed to link bicycles safety with pedestrian safety. In addition, reverse light, brake light, room mirror and side mirror were added for car safety space, and occupational safety experience was planned out using manhole cover, image of construction site and work safety equipment. Images of downtown attached to walls of car safety space were removed to resolve the problem where windows connected to outside were closed (refer to [Figure 7] and [Figure 8]).

As in [Figure 12], efficiency of the disaster safety facility model was increased by combining fire evacuation space and typhoon evacuation space. Living safety space for gas safety, electric safety and food safety was installed with dining tables for earthquake experience, and the ceiling was partially exposed for students to recognize dangerous elements of upper structure.



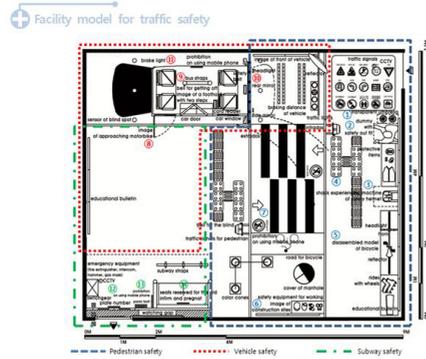
[Figure 11] Initial facility model for disaster safety



[Figure 12] Final facility model for disaster safety

A manual for facility models of safety training classes was developed to help relevant authorities such as school sites to better understand the facility models. The manual includes the directions for facility plan, directions for operation plan, facility models and operation checklist. Contents of education for each facility model were provided as shown in [Figure 13] to help easier understanding of the purpose of models. Possibility of additional education contents such as personality education using braille blocks for the disabled and environmental education using construction site was presented, along with the list of educational materials for each model shown in [Figure 14].

유휴교실을 활용한 안전체험교실 조성 가이드라인 개발



Education contents with main component of facilities

- Experiencing space for pedestrian safety
 - ① Umbrella : Visibility of transparent umbrella and opaque umbrella when walking on the street
 - ② Dummy with safety outfit
 - Advantages of wearing such items as luminous vest, belt and bright clothes when walking at night (Emphasize using head lamp of vehicle after turning off lights)
 - Way of wearing protective items for example safety helmet
 - ③ Experiencing shock of a safety helmet : Importance of safety helmet and experiencing its performance
 - ④ Braille block : Experiencing Distance from the road when waiting for traffic signals at the crosswalk (for experiencing visual impairment)



[Figure 13] Contents of each component

Equipment of facility model for traffic safety-1

Classification	Name	Unit	Quantity	Specification	Note
Subway safety	Seat	Type	1	-	Seat model for 2 persons
	Emergency call unit	Type	1	-	-
	Fire extinguisher for education	Number	1	-	Experiencing equipment
	Fire alarm	Number	1	-	-
	Gas mask	Number	1	-	-
	Screen door (general)	Type	1	Model	-
	Handcuff	Number	2	Model	Manual pulper
	Gate of subway	Type	1	Model	-
	Panic bolt (new type)	Number	1	-	Experiencing equipment
	Panic bolt (old type)	Number	1	-	Experiencing equipment
Vehicle safety	Images of the elderly and the infirm and the pregnant	Number	1	-	Experiencing equipment
	Image	Type	1	Model	Experiencing equipment
	Bus	Number	3	Model	Bus, subway, walking, basic safety education
	Vehicle model	Type	1	Model	-
	Vehicle seat	Type	2	Fixed	Experiencing safety belt
	Side mirror	Type	2	Model	Light is on when backing
	Traffic signal for vehicle	Type	1	Model	Model of traffic signals
	Reflector	Number	1	-	-
	Sign	Type	6	-	Experiencing equipment
	Blind spot	Type	6	-	(blind spot)
Pedestrian safety	Side mirror	Number	2	-	-
	Rear mirror	Number	1	-	-
	Image of foothold	Type	1	Print of actual image	-
	Card reader	Number	1	Model	-
	Image of braking distance	Type	1	Print of actual image	-
	Image of front of vehicle	Type	1	Model, Print of actual image	-
	Traffic signals (for vehicles, pedestrian)	Type	2	Mock-up	-
	Crosswalk	Type	1	Model	-
	Blue path	Type	1	Model	-
	Raised block	Type	14	-	-
Lower block	Number	14	-	-	
Button of sound signal for the blind	Number	2	-	-	
Image for prohibition on use of mobile phones	Number	3	Print of actual image	-	
Image of construction site	Type	1	Print of actual image	-	
Image of manhole cover	Number	1	Print of actual image	Displaying construction sites	
Color cones	Number	1	Mock-up	-	
Safety harness set	Type	1	-	Safety helmet, face mask, protective glove, safety belt, safety shoes	
Transparent umbrella	Number	2	-	-	
Bulletin board	Number	2	-	Traffic signs	

[Figure 14] Educational materials for each facility model

5) Policy suggestions

For continuous and substantial operation of safety training classes, ① creation of support system for substantial operation, ② expansion of incentives for motivation ③ creation of national operation management system, ④ educational spaces based on the individual environments of schools were suggested.

Creation of support system for substantial operation involves active utilization of existing 6 safety training centers sponsored by the Ministry of Education for training of safety education experts. A council of safety education instructors can be operated in the similar way as LASER Alliance of the UK for sharing of examples, training of human resources, development of educational materials and distribution of exemplary cases.

Expansion of incentives for motivation involves amendment of related laws such as the 『Regulation Governing the Promotion of Public Servants』 for a reward system and assignment of expert teachers in charge of safety education based on the senior teacher

system of city and provincial offices of education.

National operation management system can be developed as an integrated information system that provides information about facilities and education programs and appoints professional support organizations for organized implementation of the policy suggestions presented above.

Final suggestion can be categorized as follows; 1) analysis on physical conditions related to school environments, 2) development of diverse spaces by using their own physical environments such as stairs, playground, and classrooms.

Key words: School Safety, Safety Education, School Facilities, Safety Training Class, Safety Education Program, Facility Model